UNITED STATES PATENT APPLICATION

of

THOMAS EDWARD UDD

for

HUB IDU CARD INSERT PANEL AND METHOD

ABSTRACT OF THE DISCLOSURE

An insert panel assembly for the IDU cards at the hub of a point-to-multipoint millimeter wave wireless communication system. Generic cards with terminations for the selective connection of remote transceivers are provided with an apertured faceplate over which an insert panel may be placed to selectively block access to the card terminations. In one embodiment, the insert carries adaptors and another embodiment the connector on the conductor from the transceiver is configured to attach to the faceplate. In both embodiments the weight of the connector and conductor is supported by the chassis and not by the card. The connector is angled downwardly to avoid stress on the conductor and reduce the likelihood of kinking.

BACKGROUND

The present application claims the priority of pending U.S. Provisional Application Serial No. 60/266,485 filed February 6, 2001for "Antenna Provisional," the disclosure of which is hereby incorporated herein by reference. This application is related to commonly assigned United States patent application Serial Number [WT-31; HAR66 010] entitled spring Loaded Antenna Mounting System And Method and Serial Number [WT-32; HAR66 011] entitled geared Antenna Aiming System and Method, the disclosures of which are hereby incorporated herein by reference.

The present invention relates generally to the attachment of remote peripherals to chassis mounted cards, and more specifically to the attachment of remote transceivers to the printed circuit cards at the hub of a millimeter wave point-to-multipoint

communication systems.

Point-to-multipoint millimeter wave wireless communication systems are well know and are described, e.g., in the commonly assigned U.S. Patent No. 6,016,313, entitled "System and Method for Broadband Millimeter Wave Data Communication." Such systems generally consist of one or more hubs each servicing a plurality of remote nodes. The antennae of such systems are highly directional and it is critical to the successful operation of the communication system that the signals received at the hub be correctly routed to an antenna correctly aimed in both azimuth and elevation. It is typical that a hub contain multiple antennae and thus multiple cards in the hub equipment.

Point-to-multipoint communication systems are generally modular with reconfiguration of the coverage of the antennae required, e.g., as the number of subscribers increases within a sector, as subscribers come on line in sectors previously not serviced, as the communication traffic increases within a sector, etc. It is thus important that the hub equipment include a chassis capable of supporting multiple cards usable with various transducers, and that the access to the terminations on those cards be selectively restricted to avoid erroneous connections. It is accordingly an object of the present invention to provide a system and method for selectively connecting peripherals such as transducers to printed circuit cards.

Printed circuit cards are generally electrically attached by frictional connectors to the back plane or mother board mounted in a metal chassis, but the cards are not generally expected to be exposed to movement inducing forces once installed. The

terminations of printed circuit cards are often the male or female halves of a multiple pin connector and are accessible through the faceplate of the card. Such terminations are secured to the card but are not expected to subject to movement inducing forces once the card is installed into the protective chassis. Any force on the terminations may result in damage to the connection to the card and/or cause movement of the card relative to the chassis and disrupt the connection of the card to the back plane.

The connector on the conductor from the remote peripheral is generally plugged directly into the card termination. The weight of the connector on the peripheral conductor as well as the weight of the conductor itself has long been a problem in the connection of remote peripherals, as this weight is supported by the termination on the card and tends to cause unwanted movement under the influence of gravity and/or the movement of the peripheral conductor.. It is therefore another object of the present invention to provide a novel card connector and method in which the connector is supported by the chassis rather than the card.

The angle of insertion of the connector from the peripheral is generally normal to the card faceplate and parallel to the surface of the card to which the termination is mounted. It is not unusual for the conductors to transition from the horizontal to the vertical and/or laterally to one side of the chassis within an inch or two of the chassis The sharpness of this bend is increased where the conductor is long and the weight of the conductor substantial. The sharp radius of the curve induces stress in the conductor itself and on the card to which connected. It is accordingly a further object of the present

invention to provide a novel card connecting system and method in which the sharpness of the bend in the conductor is significantly recuced

These and other objects and advantages will be readily apparent from the following detailed description of illustrative embodiments when read in conjunction with the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an exploded pictorial view of a printed circuit card with one embodiment of the insert panel of the present invention.

Figure 2 is a pictorial view of an alternative configuration of the insert panel of Figure 1.

Figure 3 is a pictorial view of a further alternative configuration of the insert panel of Figure 1.

Figure 4 is an exploded pictorial view of a printed circuit card with a second embodiment of the insert panel of the present invention.

Figure 5 is a pictorial view of an alternative configuration of the insert panel of Figure 4.

Figure 6 is a slightly exploded pictorial view of a third embodiment of the panel of the present invention illustrating the sue of selectively chosen adaptors.

Figure 7 is an exploded pictorial view of a fourth embodiment of the insert panel of the present invention illustrating the use of angled integral adaptors

DETAILED DESCRIPTION

Figure 1 illustrates a typical printed circuit card having a number of terminations 12 and at least one connection 14 to the back plane of the chassis 15 (not shown in Figure 1). The card 10 includes a faceplate 14 which is visible externally of the chassis when the card is installed therein. The faceplate 16 includes plural apertures 18which provide access to the terminations 12 of the card.

An insert panel 20 is desirably less in area than the surface of the faceplate 16 s to leave an area 22 to which a label 23 may be attached indication the identity and/or use of the card. Other areas 24 may be provided for diodes or other indicators of the operation of the card. The insert panel 20 may be removably attached to the faceplate 16 in any suitable conventional manner such a threaded fasteners or the like.

As shown in Figure 1-3, the insert panel 20 may include one or more through-panel connectors or adaptors 26 permanently mounted thereto in locations corresponding to the apertures 18 in the faceplate, so that, with the panel 20 overlying the faceplate18, the distal or internal end of the connector 26 extends through the aperture 18 in the faceplate 16 into proximity to the terminations 12 of the card. Once installed, a jumper cable or other flexible conductor 28 may be used to establish an electrical connection between the connector 26 and the termination 12. Where the terminations 12 are connectors, the distal end of the connecter 26 may plug directly thereto.

The proximate end of the connector 26 may be configured in any suitable conventional way to mate with the connector 30 on the conductor 32 operatively attached to the peripheral equipment (not shown).

In the embodiment illustrated in Figure 1, the conductor 30 is supported by the panel and in turn by the chassis which also supports the card 10. This eliminates the force which otherwise may have to be supported by the terminations 12 of the card. The use of a flexible connection between the distal end of the connector 26 and the termination 12 also serves to reduce the forces applied to the card.

Clearly, the selection of a panel with the ports thereof located in predetermined locations limits access to the terminations of the card. This may be an advantage where, e..g., a card has terminations leading to circuits to which a particular entity has not subscribed. Limiting the accessibility of the terminations may also be an advantage in the installation and reconfiguration of the equipment.

In the embodiment illustrated in Figure 4 where like numerical designations are used for like elements, the terminations 12 are shown as connectors which are accessible through the apertures 18 in the faceplate 16. The insert panel 20 may also include apertures located in alignment with the apertures 18 of the faceplate so that the connector 30 on the end of the conductor 32 from the peripheral equipment may plug directly into the termination 12 through the aligned apertures 34 and 18. As shown in Figure 5,the apertures may vary in size and location to selectively limit access to the terminations 12 of the card 10.

As illustrated in Figure 4, the terminations 12 of the card must resist the forces placed thereon by the connectors30 and conductors 12. However, and as suggested in the adaptors 40 illustrated in Figure 6, the connectors 30 of Figure 4 may be provided with any suitable conventional means for attachment to the faceplate 20 so that the forces from the connector 30 and conductor 32 may be transferred to the faceplate 20 rather than to the card 10.

In many cases the weight of the connector 26 and the conductor cause a sharp bend in the conductor 32 because of he effects of gravity. In other instances, the location

of the peripheral equipment dictates the direction the conductor 32 must take from the card 10, and that direction may be up as suggested in Figures 1 and 4, down as suggested in Figures 6 and 7, or laterally.

The sharpness of the bend in the conductor 32, however induced, increases the stress in the conductor 32. Where the direction the conductor 32 must take is known, the insert panel 20 may include ports 40 angled in that known direction. By the use of such angled ports, the internal wiring may be manufactured to obviate bending stress and the conductor 32 and its connector 30 may remain axial with the port 40.

As shown in Figure 6, the ports 40 permanently attached to the insert panel 20 in Figure 7 transfer the support of the connection to the peripheral to the chassis 15 by the panel 20. However, the ports may be adaptors individually selected and attached to the insert panel 20 by any suitable conventional means. In this way, the forces from the connector 30 of the peripheral may be transferred to the adaptor 40 through the panel 20 to the chassis 15. In addition, great flexibility is provided in the connection.

It should be understood that the foregoing description of preferred embodiments is illustrative only and that various changes, substitutions and alterations can be made herein without departing from the spirit and scope of the invention as defined by the appended claims.